

Amdt. dated May 1, 2006

Reply to Office action of January 31, 2006

**Amendments to the Drawings**

The Examiner has objected to the drawings as having poor line quality and required replacement drawings to be filed in this case.

Submitted wherewith are replacement drawings for this case. No new matter has been added to the replacement drawings.

Attachment: Annotated Drawing Sheets

Replacement Drawing Sheets

**REMARKS/ARGUMENTS**

Reconsideration of this application is respectfully requested.

It is noted that this application as filed contains 36 claims. The Office Action dated January 31, 2006, addresses only 16 claims. In a telephone with Examiner Shakeri on May 1, 2006, the Examiner acknowledged the existence of 36 claims in the case, and requested that the instant amendment respond to the rejection of claims 1-16. The Examiner indicated that the second Office Action in this case would be non-final, to allow applicant the ability to have any amendments made in response to the Second Office Action considered by the Examiner.

The Examiner is thanked for his consideration in this regard.

**Drawings**

The drawings have been objected to under 37 CFR 1.84(i). Lines, numbers and letters are not uniformly thick and well defined, clean and durable and black (poor line quality) Figures 1-6. The Examiner has requested corrected drawing sheets in compliance with 37 1.121(d).

In response to the Examiner's requirement, submitted herewith for the Examiner's approval are replacement drawing sheets showing Figures 1-6. The drawings on the replacement drawing sheets correspond in subject matter and content to the original drawings filed with this case. No new matter has been added by the replacement drawing sheets.

**Specification**

The Examiner has objected to the Specification at page 1, line 22 noting that the

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Herrman '562 patent should be the Herrman '564 patent.

This amendment corrects the Specification at page 1, line 22.

This amendment further makes other changes to the specification to correct minor informalities of grammar, spelling or omitted words.

#### Claim Numbering

It is noted that this case was filed with two claims numbered 32. This amendment renumbers the claims following the first claim 32 so that the claim numbers follow a normal numerical progression.

#### Claim Rejections 35 USC 103

Claims 1-16 have been rejected under 35 USC 103(a) as being unpatentable over Preston, et al. (6,196,911) in view any one of Li et al. (6,609,963), Matsumoto et al. (6,394, 888) or Donahue et al. (5,989,114). This rejection is respectfully traversed.

The Examiner's rejection principally relies on the reference to Preston '911. What exactly does Preston '911 teach? Preston '911 teaches that laminated abrasive segments 14 may be fabricated and mounted on a disk 20 in a variety of patterns. The composition and method of making the abrasive segments 14 are shown in Figure 5. A number of thickness layers 40, 42, and 44 are stacked together to make a segment of the desired thickness. Thickness layer 40, for example, includes a bond material 50, an adhesive layer 80, a porous layer 60, and a layer of hard or abrasive particles 70. Figure 5 shows that each layer of abrasive particles 70 is separated from the next layer of abrasive particles 70 by three other layers that contain no abrasive particles. The porous layer 60 is carefully chosen depending on the size of the abrasive particles being used so that the

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particles reside in individual cells of the porous layer as shown in Figures 5A and 5B. Layers 42 and 44 are similarly arranged and comprised. The thickness layers are then laminated together using press members 81 and 85 to make the laminated segment 14.

In applicant's device as disclosed and claimed, the CBN is dispersed in a resin bond. The term "dispersed" means scattered in various directions, or distributed widely. Thus, the CBN is scattered and randomly distributed throughout the resin bond. The CBN is not arranged in a discreet layer between layers of adhesive, and there is no screen material which is used to arrange the CBN in an ordered pattern. Applicant's device is not formed from separate thickness layers that are laminated together in a press. As shown in Applicant's Figure 3, the particles of material in the abrasive segment 30 are evenly and randomly dispersed throughout the resin bond.

The Preston '911 patent discloses that a lubricant may be added to the matrix material 16 which surrounds the abrasive, but there is no disclosure at all that a lubricant is added to the abrasive segments 14. The Preston '911 device is specifically designed to be used with copious quantities of fluid lubricant. The face of the Preston disk includes channels 18 for carrying lubricant and swarf away from the face of the wheel and passages 24 to allow coolant to be supplied from the back of the wheel to the channels 18.

Applicant's device is specifically designed for dry or near dry machining in which a nominal amount of coolant and lubricating fluid is used. As disclosed and claimed, applicant's grinding device includes a lubricant material both in the grinding segments and in the matrix which surrounds the grinding segments.

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Applicant claims a heat-dissipative melt-phase metal material as one of the materials in the grinding segments. The Examiner refers to the use of copper or tin in the Preston '911 device as meeting this limitation. However, Preston '911 is not concerned with including a melt-phase material in his device since the Preston '911 device is cooled through the use of coolant and is not intended for dry machining. In Preston, metals such copper, tin, zinc, nickel, cobalt, steel, chromium, tungsten, carbide and molybdenum are used as a reinforcing layer. The use of a reinforcing layer in an abrasive device is not at all the same as the use of a phase melt metal used for heat dissipation in an abrasive device designed for dry machining. Moreover, although copper and tin are used to make bronze, bronze is an alloy and thus possesses phase melt properties which are different from copper and tin. For this reason, the disclosure of copper and tin in the Preston '911 patent as a reinforcing material does not meet the limitation in applicant's claims of either a melt phase metal material or a melt phase metal material comprising a copper tin alloy.

The Examiner relies on the references to Li et al., Matsumoto et al., and Donahue et al. (the "Filler References") to teach the use of a porosity filler material in the form of silica spheres or ceramic bubbles in a matrix. However, the Filler References taken singly or in combination fail to cure the deficiencies of the Preston '911 reference in providing a proper prior art basis on which to reject the claims. None of these Filler References teach or suggest a grinding device designed for dry machining in which the grinding device comprises a plurality of grinding segments with a matrix material surrounding the grinding segments, and in which a melt phase metal material is used to dissipate heat, and in which the melt phase metal material is a copper tin alloy. As a

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result, the combination of these references with the Preston '911 reference fail to teach, show or render obvious applicant's device as disclosed and claimed.

Moreover, the Filler References teach away from applicant's invention as disclosed and claimed. Li et al adds porosity to the superabrasive portion of the abrasive tool. In applicant's device as disclosed and claimed, the porosity filler is added to the matrix. Li et al uses a vitreous bond such as a glass frit. Applicants disclose and claim a resin bond.

Similar to Li et al, Matsumoto et al uses hollow spheres in the abrasive portion of a tool. In applicant's device, the porosity filler is added to the matrix.

In Donahue et al, the primary binder for the abrasive material is epoxy. In applicant's device as disclosed and claimed, the binder for the abrasive material is a melt phase metal with a polyimide resin.

The remaining references cited by the Examiner have been reviewed with interest. However, these references, taken singly or in combination, fail to teach, show or render obvious applicant's invention as claimed.

For the foregoing reasons it is believed that this Amendment places the claims now appearing in this case in condition for allowance, and an early notice to such effect is respectfully solicited.

In the event that the Examiner does not agree that the claims are now in condition for allowance, he is courteously invited to contact the undersigned at the number given below in order to discuss any changes which the Examiner believes would lead to an allowance of the claims.

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It is not believed that any new fees are necessitated by the entry of this amendment. However in the event that any new fees or charges are required, authorization is hereby given to charge such fees to applicant's Deposit Account No 50-0852. A duplicate copy of this sheet is enclosed.

Respectfully submitted,

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Date: May 1, 2006

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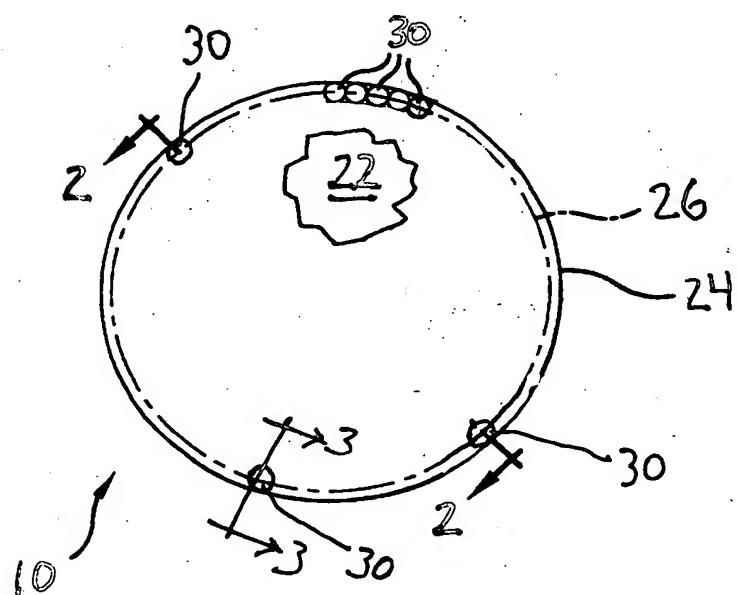


FIG. 1

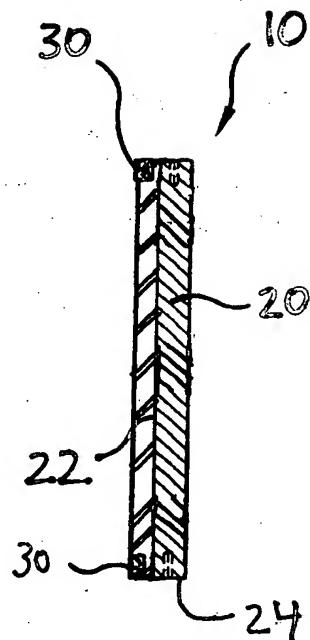


FIG. 2

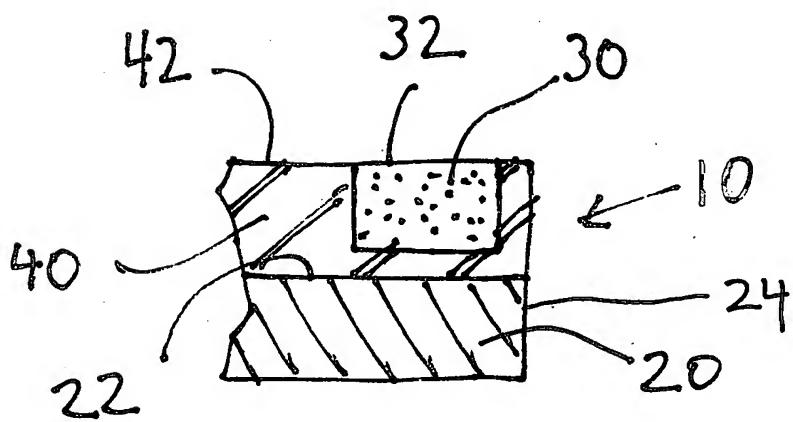


FIG. 3

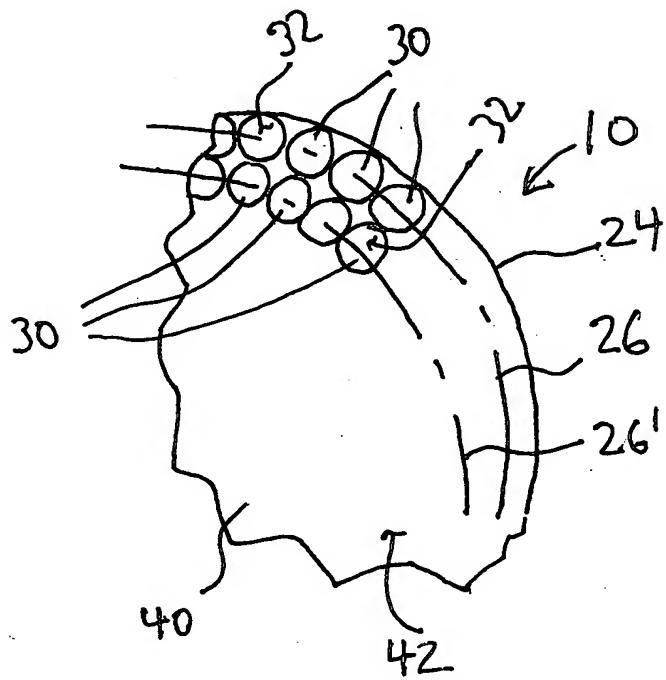


FIG. 4

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